CONTRACT NO. 16-021C

LTK ENGINEERING SERVICES

TASK ORDER NO. 1

ATTACHMENT A

NEW YORK PENN STATION CAPACITY IMPROVEMENTS

Revised April 5, 2018

STUDY PURPOSE

NJ TRANSIT is seeking external consultant assistance to undertake a conceptual planning effort to determine if a practical incremental investment plan can be developed for changing physical infrastructure which increases train capacity in or adjacent to Penn Station, NY, to accommodate current and future trans-Hudson rail transit passenger demand. NJ TRANSIT Capital Planning staff, many of whom have extensive experience with trans-Hudson and rail transit planning, believe there may be an incremental investment approach which could be pursued in the present planning and financial environment to provide capacity relief in the near term while planning, funding, and construction is in progress for the larger Gateway initiatives. This is an exploratory effort to identify if such opportunities exist which can be advanced more readily in the nearer term, their benefits and challenges, and how they can coordinate with other longer term possibilities to undertake larger capacity increase projects. The products of this high-level exploratory effort will allow NJ TRANSIT management to make further judgments about the future course of action it will choose to take regarding advancing planning for increased trans-Hudson rail capacity. It is understood that if the results of this effort are positive, NJ TRANSIT may elect to expand this work in coordination with other agencies as appropriate.

PROPOSED TASK ASSIGNMENT TEAM

The LTK Team is pleased to respond to this Task Order Assignment Request and has developed a Team that is uniquely qualified to meet NJ TRANSIT Management's needs to determine the best path forward towards realizing cost effective capacity improvements at Penn Station, NY. Our proposed team includes recognized industry leaders from LTK, Arup, Sowinski Sullivan Architects, and Envision, and Matrix New World.

The LTK Team is proposing a conceptual planning and engineering team led by Daniel Weiss of Arup to accomplish the goals and objectives of this study effort. Daniel will be supported by Christopher Taylor of Arup on conceptual engineering, by Bill Lipfert of LTK on operational analyses and systems considerations for any proposed alternatives, and by Rich Sullivan of Sowinski Sullivan Architects for study of concepts to tie any proposed new platforms into the larger Penn Station complex, NYCT subway stations, and the surrounding streetscape. The team will also be supported by the larger Arup organization in the areas of MEP and ventilation

requirements, constructability reviews, and pedestrian analyses; by Envision for cost estimating and scheduling of proposed alternatives; and, by Matrix New World on the consolidation of existing conditions information into a study basemap.

Our proposed Task Manager is Daniel Weiss, P.E. of Arup, who is located in their New York City office. Daniel has extensive experience working for NJ TRANSIT, including playing key roles on the Newark Broad Street Station Capacity Constraint Relief and ADA Project, the Access to the Region's Core Project, the Penn Station Capacity Enhancements Project, and the Moynihan Station Project. Daniel has the management skills and expertise to coordinate the many discipline efforts the LTK Team will bring to bear on this project and long relationships with our proposed leaders. Daniel will be able to fully support NJ TRANSIT in this effort and can directly coordinate with Arup's tunneling, ventilation, MEP, and pedestrian analysis experts also located in New York to validate the feasibility of any alternatives under study.

Our proposed Engineering Lead is Christopher Taylor, P.E. of Arup. Chris has played a key role in many major railroad infrastructure planning and environmental studies as the lead engineer. His understanding of planning, design, construction, and the environmental approvals process allows him to identify potential project hurdles early in the development phase and to develop designs that avoid or mitigate impacts in order to streamline the approvals process. Chris served as lead engineer for NJ TRANSIT's Access to the Regions Core Project, which not only included development of connections to existing Penn Station and design of the proposed new 34th Street terminal, but also included study of numerous alternatives to increase capacity of existing Penn Station. These alternatives included improvements to Penn Station's "E" Yard, trackwork reconfigurations to support the Brookfield overbuild, new connections to the Empire Line, and improvements to Platforms 1-4 as part of the ARC Advanced Conceptual Engineering study. Chris also led Amtrak's NEC HSR Vision study that included development of a Unified Gateway proposal that brought together Amtrak's Regional and HSR needs, NJ TRANSIT capacity expansion needs, and Metro North's Penn Station access needs into one consolidated plan for phased terminal expansion. Chris provides an expert approach to alternatives analysis and documentation for railroad infrastructure projects, including stakeholder and public outreach efforts.

Our proposed Rail Capacity Lead is Bill Lipfert of LTK. Bill lead's LTK's Rail Operations Planning & Simulation Group, which includes rail operations analysts and veteran industry rail scheduling professionals to provide the necessary analytical resources to assess rail capacity benefits. Bill has led numerous operational analysis studies within Penn Station, NY and his knowledge of operations and capacity constraints within Penn Station is extensive. Bill has long-standing relationships with NJ TRANSIT, Amtrak, and LIRR and has worked hand-in-hand with each of these railroads to help solve immediate problems and to identify potential long-term operational changes, systems improvements, and infrastructure changes to address capacity constraints. Bill has worked closely with Chris Taylor on numerous projects for NJ TRANSIT and Amtrak as the rail operations leader, including on NJ TRANSIT's Access to the Region's Core, the Penn Station Capacity Enhancements project, the Penn Station Operation Study, and Amtrak's NEC HSR Vision Study.

Our proposed Architectural Lead is Richard Sullivan, R.A. the principal architect at Sowinski Sullivan Architects. He has over 30 years of technical and design experience built on architecture in the Northeast. Rich is well versed in NJ TRANSIT standards and approaches to egress and level of service. In addition to leading the architecture for initial planning studies for capacity enhancements at Newark Penn Station, from which the later studies evolved, he has also performed extensive LOS and egress analysis studies at every one of SEPTA's major regional rail stations over the past five years. He has experience at NY Penn Station and is currently working on enhancements at the two subway stations that serve the facility.

Many of the other proposed LTK Team staff have worked with NJ TRANSIT on previous assignments. Much of this experience is directly relevant to the work elements expected to be undertaken within this Task Assignment. Additionally, members of the proposed team have extensive experience on other local projects relevant to the Task Assignment. For example, Jon Hurt, P.E. and Richard Potter, P.E. have played key roles on numerous tunneling and below-grade design efforts that will directly inform this study's feasibility reviews, including Second Avenue Subway and 7 Line Extension, and East Side Access projects. As a result, there will be virtually no learning curve, which translates into reduced overall risk, and greater schedule and cost efficiency. We understand NJ TRANSIT's policies and procedures and can immediately start work in a meaningful manner which will complement the efforts of NJ TRANSIT's own staff. We bring a thorough understanding of NJ TRANSIT's systems, infrastructure and maintenance issues, and have good working relationships with NJ TRANSIT personnel. Benefits to NJ TRANSIT include no wasted costs, and team effectiveness from Day One.

We will continue to provide the same strong management presence that has guided our efforts for NJ TRANSIT on previous assignments. The essence of our approach is providing quality work while respecting budget and schedule realities. Bill Lipfert leads our Task Order Contract Team and will bring continuity of this approach to this Task Assignment.

The LTK Team is committed to meeting the DBE participation goals of the larger TOC contract. In this regard, the team includes expertise from Sowinski Sullivan, Matrix New World, and Envision Consultants. Each member of our team was selected for their unique and directly relevant expertise and experience, and for their strong relationships with other members of the LTK Team. As shown in our cost proposal, the extensive task participation of these three firms will add project value while allowing the LTK Team to exceed the DBE participation goals.

INTRODUCTION

Beginning in 1994, the Access to the Region's Core (ARC) Major Investment Study researched, analyzed and short-listed a set of basic alternatives to increase trans-Hudson rail capacity. The ARC alternative chosen for advancement into construction involved building new platforms and track under 34th Street to augment the existing Penn Station, NY capacity located to its south.

Locating additional new rail capacity in close proximity to Penn Station, NY is also consistent with the recently issued FRA managed Northeast Corridor Tier I Environmental Impact Statement Record of Decision (ROD).

This proposed work scope is for an exploratory conceptual planning effort to outline an incremental plan for increasing train and passenger capacity in Midtown Manhattan. The incremental plan is meant to identify feasible and cost-effective alternatives that can potentially be implemented within the next ten to fifteen years with minimal impacts to existing and planned developments. Alternatives proposed for further study through this effort will provide for a meaningful increase in capacity in the near-term while not precluding longer term investment plans that would address the projected trans-Hudson rail capacity needs of 2040 and beyond.

While Amtrak has been advancing plans for the Gateway Program to enhance Northeast Corridor (NEC) capacity between Newark, NJ and Penn Station New York, current planning by Amtrak has not confirmed the feasibility and constructability of the full Gateway Penn South proposal, nor has it defined a plan for funding and delivery of that project.

NJ TRANSIT has identified the following potential challenges regarding the currently proposed Gateway Program.

- Past and recent experience indicates that the original plan for expansion of platform capacity at Penn Station, NY as part of the Gateway program, the Gateway Penn South proposal, would likely meet with various forms of opposition given that it involves the taking of private property for one or more NYC blocks between 9th and 6th Avenues and between 30th and 31st Street. This would present significant risk that project approvals, as required under the National Environmental Policy Act (NEPA), would either be significantly delayed or impractical to secure.
- Funding for the Penn Station platform capacity expansion envisioned as part of the larger Gateway project in the near term may be difficult if not impractical to secure given the fierce competition for limited financial resources and other necessary and local NEC infrastructure investments, including, but not limited to the following.
    - Portal North and South Bridges
    - North River Tunnel rehabilitation
    - New Hudson River Tunnel Project
    - Sawtooth Bridge Replacement
    - Harrison Fourth Track
    - Elizabeth Fifth Track
    - New Centrally Located Train Storage Yard and Maintenance Facility
    - Secaucus Station Improvements and Loop Tracks
    - Highline Capacity Expansion
- The current full Gateway proposal for Penn Station New York expansion has generated a number of major concerns for NJ TRANSIT staff including:

- Ability to achieve the project's train capacity increase goal;
- Satisfying customer needs in terms of location of station capacity;
- Providing required connectivity to streets and subways;
- Confirmation of constructability of all proposed project elements;
- Confirmation that some project elements do not preclude additional capacity increases; and
- Providing for a reliable and efficient train operation.

Given these concerns, NJ TRANSIT seeks to explore a more limited interim plan to provide the critical near-term capacity increases needed by NJ TRANSIT to meet growth in near and intermediate term market demand for rail transit into Midtown Manhattan. As such, this conceptual planning study is meant to identify and explore less physically intrusive, less expensive alternatives to the full Gateway Penn South proposal that have the potential to address the near-term need for additional train and passenger handing capacity in Midtown Manhattan in proximity to the existing Penn Station, NY. While this study will analyze intermediate improvements that could allow for increased passenger capacity, it will only consider alternatives that will work with the current proposal for providing two new tracks under the Hudson River and rehabilitation of the existing North River Tunnel tubes that are part of the larger Gateway Program. Since the full Hudson Tunnel Project is expected to be completed around 2030, the target construction completion date of any Penn Station enhancement alternative identified through this study should be in advance of that time. Note that nearer term improvements to add capacity prior to the new Hudson Tunnel opening such as platform improvements, concourse improvements, wayfinding, vertical access improvements, and other such measures are not covered under this scope of work. The only capacity improvements being studied under this effort that would not rely on the opening of the new Hudson Tunnel are proposed improvements to existing Platforms 1 and 2 (including potential extensions), potential operational modifications, and potential additional platform edges and tail tracks extending eastward under 31st Street.

Concept Planning Purpose

This concept planning effort is proposed to define one or more workable alternatives that take advantage of the trans-Hudson train capacity that the Hudson Tunnel Project could ultimately provide, but reduce the scale and footprint of the proposed next phase of increased train platform and station capacity. The incremental Penn Station Capacity Expansion alternative(s) identified should not preclude other longer term larger increases in train and passenger capacity projected to be needed beyond the opening date of the new Hudson River Tunnels.

To be sure that adequate due diligence has been completed, NJ TRANSIT staff are seeking previously experienced and specifically skilled consultant assistance to define a potential incremental Penn Station capacity expansion approach that will identify, at a conceptual planning level, alternative initiatives that demonstrate what is physically and operationally possible. The LTK Team fully meets this requirement. The conceptual planning and engineering work is meant

to define a project that can fit within the current built-up environment with minimal impact and that can satisfy certain performance criteria.

The conceptual planning effort is intended to accomplish several foundational requirements for advancing near-term Penn Station Capacity Expansion:

1. Inventory prior proposed plans for increasing train and passenger capacity at Penn Station New York. Highlight benefits and issues with each.
2. Create a physical constraints data base that defines geotechnical conditions, and existing and planned infrastructure constraints, in order to define an envelope into which a potential project might fit with minimal impact.
3. Reassess current operating practices to determine if there are any potential changes that might help increase the number of seats per hour that NJ TRANSIT trains can provide into Penn Station, NY without significant physical modifications to the existing tracks and station facilities.
4. Clarify NJ TRANSIT's goals for increased medium-term operational capacity and NJ TRANSIT's constraints in terms of project delivery requirements, such as cost and schedule.
5. Develop an alternatives evaluation approach utilizing key metrics that address NJ TRANSIT operational needs and project delivery constraints. These constraints will include cost, schedule, impacts, project development approach, and synergy with other planned projects.
6. Develop conceptual physical plans for up to three infrastructure improvement alternatives at a sufficient level of detail to allow for a preliminary alternatives screening process to be completed. The level of detail developed should be sufficient to confirm, at a conceptual level of project definition, operational benefits, feasibility of proposed infrastructure, deliverability within Study timeline constraints that will be defined by NJ TRANSIT, and compatibility with longer term capacity enhancements.
7. Develop conceptual plans for two primarily operations oriented alternatives to increase train and passenger capacity.
8. Develop alternative train operating scenarios for the five alternatives (three infrastructure related and two operations oriented alternatives) to determine the best approach to maximize the number of seats per hour and improve train operating reliability without significant physical modifications to the station.
9. Screen feasible alternatives based on the identified evaluation criteria and recommend the two or three best initiatives to advance to further study or to advance to coordination with Study stakeholders.
10. Coordinate with key Study stakeholders on a limited basis and only as directed by NJ TRANSIT as defined in Task 7.

11. Document the analysis completed in a manner that is defensible and in a format that promotes and facilitates transparent decision-making regarding the steps that must be taken to move the best alternative(s) forward.

Concept Planning Effort Principles

The principles to be followed in developing a proposed incremental plan include:

- Examining both ways to increase the total number of seats on NJ TRANSIT operated trains and the means of increasing total train capacity within a one hour period.
- Maximizing the capacity potential of existing stub-ended tracks 1-4, which currently cannot accommodate the 10-12 car NJ TRANSIT trains typical required to meet peak period demand.
- Reducing congestion on the U and M ladder tracks to allow for greater reliability of service for trains operating on tracks 1-12.
- Configuring new track connections to new platforms so that they connect with the planned new Hudson Tunnels to use the trans-Hudson train capacity that could be available in the future. Where practicable, connections should also be available to existing North River Tunnel throat tracks at Penn Station.
- Adding platform capacity and connecting tracks that utilize publicly owned and Amtrak right-of-way and property to the extent practicable. Implicitly, this means minimizing the need to acquire outright or substantially diminish the function of existing privately owned development in order to secure stakeholder buy-in, environmental approvals, and project financing necessary to deliver enhanced capacity within the medium-term.
- Maximizing future train operating flexibility and redundancy for NJ TRANSIT.
- Ensuring that new platforms are of sufficient widths to provide for vertical and horizontal pedestrian flows and to accommodate easier and quicker loading and unloading of trains.
- Maximizing pedestrian connectivity and accessibility as part of improvements to Platforms 1-4 and to any new platforms. Where practicable, connections should be provided to existing Penn Station, to the soon to open Moynihan portion of Penn Station, and to the subway lines on 6th, 7th and 8th Avenues. Proposals forwarded for further consideration should not preclude any such connections.
- Verifying that alternatives complement other plans for improving Penn Station, NY as part of joint Amtrak/LIRR/NJ TRANSIT planning effort for this station. Alternatives must not preclude the full platform capacity proposed under the Gateway Program's Penn South proposal, but need not accommodate that specific design arrangement.

Task Assignment Schedule

The LTK Team recognizes that this work must be done within a relatively confined time period,

thus the emphasis within the Task Order Assignment request on prior experience and relevant quick turn-around sketch planning skills. While the LTK Team meets this requirement, NJ TRANSIT identified that this Task Assignment should take not more than six months from issuance of a Notice to Proceed (NTP), and our review of the work required indicates that an eight month schedule is more realistic for this assignment. Individual task durations indicated in the Task Assignment Request add up to 62 weeks (about 14 months) in total. We believe that the individual task durations were appropriate, but do not believe there is enough work that can proceed concurrently to allow those 14 months of activity to be completed in only six months. As such, we have developed the attached proposed Task Assignment Schedule, which illustrates the proposed sequencing of individual work tasks for NJ TRANSIT consideration.

Proposed Study Tasks

Task One: Inventory and Review of Existing Conditions Information (8 weeks)

A great deal of work has already been done by NJ TRANSIT and by Amtrak to study potential improvements to Penn Station New York. This work has included the ARC study, the Gateway Project, the Penn Station Operation Study, the Penn Station Capacity Enhancements study, the Moynihan Station project, the Penn Station Vision study, and numerous other efforts. Many of these studies have included site-specific topographic surveys and other field surveys within Penn Station and the surrounding environment on issues ranging from geotechnical conditions to wayfinding.

In addition to information potentially available from these various Penn Station studies, historic information on Penn Station and information available from numerous projects within the surrounding area that have been planned or recently completed should be available.

The development of study base mapping will use readily available information and not initiate new lines of survey or investigation, unless necessary to fill gaps in already available information. Given the volume of information potentially available on projects planned or constructed in and around Penn Station, NY over the last 100 years, our data collection efforts will be limited to the budget and schedule allowances provided for the Task 1 scope of work. To make the best use of these limited resources, our work will focus on collection of information that is likely to define the space constraints within which study alternatives must fit and which could significantly influence alternative feasibility, including:

1. Archive information defining the built environment in and around Penn Station, NY within the limits of potential alternatives, namely along 31st Street.
2. Major planned projects within the last 20 years for which electronic survey information or design drawings are potentially available along 31st Street.
3. Planning, design, and construction documentation for the Access to the Region's Core, Gateway, Moynihan Station, and West Side Yard overbuild projects.

Within these constraints, Task 1 will include the following discrete efforts:

- Review of prior proposed plans and supporting background materials for increasing train and passenger capacity at Penn Station New York and nearby.
- Compile an inventory of potential sources for existing conditions information and planned improvements in and around Penn Station New York. This will include: existing buildings and passageways in the area; projects within the Penn Station area that can potentially provide archive, historic, and survey information; projects that proposed improvements to Penn Station and the surrounding NYCT subway stations; projects that proposed new or enhanced transit services; projects that proposed street or pedestrian circulation improvements; and planned developments.
- Identify availability of information from each of the potential sources and categorize according to the type and geographic extent of information available.
- Gather and review information available where applicable to the Study effort at hand. Utilities, geotechnical, and other subsurface information available from gathered project information will be incorporated. No gathering of detailed utility mapping directly from utility owners is assumed. Focus will be on major utilities such as City water tunnels, major gravity sewers, and major gas lines that would critically influence space constraints and have the potential to influence feasibility of alternative construction. Geotechnical information will be as available from other project drawings and no study of geotechnical boring information is assumed. It is assumed that more information will be available west of Seventh Avenue given the numerous planned projects over the past several decades. Where gaps in data exist, available information from NYCT archive information, building department records, and other sources will be used to estimate subsurface conditions. No new geotechnical studies are assumed.
- Collection of as-built information for the station structure and historical buildings and foundations from record drawings and from review of historical aerial photography and images from construction of the station.
- In addition to review of physical constraints, the LTK Team will review and summarize findings of prior planning efforts regarding station and platform access, circulation patterns, bottlenecks, crowding, queueing, and wayfinding. The LTK Team will also review forecasts of passenger patronage (developed by others) and how future pedestrian movements were meant to be served through proposed circulation interventions.
- The LTK Team will inventory pertinent information gathered concerning facts and plans on the existing built environment surrounding the study area and planned future constraints due to projected development.

Management of the data gathered, and focusing data collection of the information that truly matters, will be a key effort for this study. One of the significant challenges with studying improvements at Penn Station is the sheer volume of information available given the age of the station and the numerous projects planned or completed there. Similarly, Penn Station is

surrounded by a complex built environment that has gone through significant changes throughout the years, especially within recent years. For this recent the LTK Team proposes development of a basic database of information sources including existing buildings and completed and planned projects in and around Penn Station. The database will provide general description, year, availability, owner or source of information, with contact information if available, and commentary regarding applicability to study effort and key findings.

Luv Seghal of Arup will work closely with Chris Taylor, Bill Lipfert, Rich Sullivan, and Jon Hurt to focus in on the data required, and to limit the data collection effort to that reasonable within the budget and schedule limitations included in this proposal. Luv will also work closely with these LTK Team leaders and with NJ TRANSIT to gather, organize, and coordinate the data collection effort so that we can maximize the data collected. To ensure that the work efforts of this Task Assignment truly provide value to NJ TRANSIT in future efforts and to bring order to the vast information likely to be gathered, Kevin Narvaez, a Technology Manager with Envision will develop a basic database of information gathered including existing facilities, buildings, and infrastructure; and, completed and planned projects in and around Penn Station. The database will provide general description, year, availability, owner or source of information, with contact information if available, and commentary regarding applicability to study effort and key findings.

Deliverables for Task 1

- Draft and Final Technical Memorandums documenting the work of Task 1. This will include a summary of the built environment surrounding Penn Station, a review of relevant past plans for improvements to Penn Station, a summary of relevant Penn Station improvements and developments underway or reasonably expected to advance, and a summary of the data collection effort.
- Basic database of information gathered for development of the Study physical feasibility base mapping. Information will be compiled and organized in a format suitable for transfer to NJ TRANSIT for any future study efforts.

Task Two: Development of Study Base Map and Information Graphics (8 weeks)

Based on the inventory and compilation of data under Task 1, a base map will be developed that defines the existing and planned physical built environment envelope into which a potential Penn Station Capacity Expansion Project might fit. Stephen Moncrief, PLS of Matrix New World will lead our efforts to consolidate information into a conceptual three dimension model defining the build environment constraints surrounding Penn Station. Matrix has undertaken numerous detailed survey efforts within Penn Station and will be supported by Arup's own internal CADD/BIM experts led by Jody Vukas.

The base map level of detail will be dictated by information gathered and budgetary constraints, but will be sufficient to validate feasibility of alternatives at the conceptual level. Cross sections at key locations (both east-west and north-south) to help define the space constraints will be developed. Work under this task will include development of appropriate maps, diagrams, and

plans required to define the existing conditions and planned development within the Study area. As appropriate, graphics will be developed to show the footprint and impact of the various relevant Penn Station improvement and local development projects identified under Task 1.

Work will clearly define the physical constraints and the available envelope within which adding new track and platform capacity might proceed, including potential extensions of existing Tracks 1 - 4 and extension/tail tracks of some or all of the new tracks identified as part of this study. The LTK Team will also indicate potential paths to gain access to the potential track and platform improvements from both the existing and future Hudson River Tunnels..

Deliverables for Task 2:

Study area base map in MicroStation format. Plans, sections, and graphics of the Study area illustrating existing and projected constraints.

Task Three: Development of Approach to Alternatives Development and Alternatives Evaluation (8 weeks)

Conceptual planning and engineering begins with the problem statement, incorporates user needs in development of program requirements, balances competing objectives, outlines alternative design and implementation approaches in careful consideration of appropriate stakeholder and environmental concerns, and defines expected project impacts, costs, and benefits. The process and results of the Study will be clearly and defensibly documented by the LTK Team so that NJ TRANSIT planning staff can communicate effectively and confidently with management – so that the right project will move forward successfully through well identified next steps. Task 3 is about setting up the alternatives evaluation method that incorporates these requirements and will ensure that the right projects are selected for advancement.

The first step will be to establish the problem statement and clearly define the Study goals and objectives. This process will involve the LTK Team working closely with NJ TRANSIT staff to ask the right questions and clearly define and document the basis for each potentially recommended initiative, the steps necessary to complete the recommended initiatives, and the constraints within which potential initiatives must fit:

- What is the purpose of the Study?
- What is the functional need?
- What are the goals and objectives?
- What are study budget and schedule constraints?

The second step will be to identify key stakeholders and set out a plan to consider their concerns in concept development and evaluation. Study stakeholders may include both internal user groups and external interested parties and responsible agencies. Establishing who these are, and anticipating their concerns at the appropriate stage is important in advancing viable alternatives. Given the sensitive and preliminary nature of this initial due-diligence planning effort to produce results for an internal NJ TRANSIT management review, an intense engagement of external stakeholders is not assumed, but the LTK Team will work with NJ TRANSIT to identify key project stakeholders and understand their concerns at this early stage so that future efforts will be

able to receive the concurrence needed, to avoid missteps and rework, and to build project support while minimizing project opposition. The key questions to tackle early on are:

- Who are the project user groups and stakeholders, what is the nature of their interest and when might it be appropriate following this effort to engage with them?
- What are their review responsibilities and approval requirements?
- What input is required from these groups?
- What are their general concerns?

The third step will be to establish a preliminary, objective, and professionally defensible approach to development of Study alternatives, to screening of competing alternatives, and to evaluation of project impacts and benefits. The LTK Team will document an understanding and agreement with designated key NJ TRANSIT staff on the approach required from the outset of the project. This will include analysis methods, potential stakeholder issues and input requirements, review and approval requirements, key decision points, the Study schedule, and the final deliverables required. This will focus LTK Team resources on the most critical design, environmental, policy, and financial issues and will define the level of detail required. Before alternatives development begins the LTK Team will establish clear agreement with NJ TRANSIT regarding the key evaluation criteria. These criteria will be used to screen competing alternatives, to establish impacts, and to weigh benefits. Criteria will be broad enough to evaluate not only whether a given alternative meets the defined need and the Study goals and objectives, but also the concerns of NJ TRANSIT stakeholders.

The fourth step in the process will be reaching agreement between the LTK Team and NJ TRANSIT on the appropriate level of detail for development of Study alternatives. Sound capital project planning requires development of the appropriate level of detail to make informed decisions that will not need to be revisited during more advanced stages of planning and design. In keeping with the exploratory nature of the requested work, the appropriate level of detail that can be developed for this Study will be limited by the overall scale of the potential project and the desired schedule and budget constraints. However, the level of detail will be sufficient to define the proposed passenger and train capacity increase, the proposed infrastructure configuration, and the construction approach to reasonably confirm feasibility. The detail developed will allow for a comparative analysis of competing alternatives, will sufficiently communicate the proposed alternatives to NJ TRANSIT management, will allow for an assessment of operational feasibility and benefits and of potential environmental and property impacts, and will support development of comparative capital cost estimates and construction schedules.

The last step in the process, study reporting, is the first step in moving a potential project forward beyond the Study, or in deciding not to advance a project. The methodology developed by the LTK Team in close coordination with NJ TRANSIT for the conceptual design development and alternatives evaluation will be defensible, will withstand the scrutiny of the review and approval process, will be understandable by the lay person, and will be presented in a format that promotes and facilitates transparent decision-making. For a project that is meant to advance, documentation must be viewed as the business case for an investment that could potentially reach into several

hundred millions of dollars. The LTK Team will develop a report that provides the same succinct, objective, and quantitative analysis expected by a private investor and will address project requirements and risks.

Deliverables for Task 3:

- Draft and Final Technical Memorandums describing Study goals and objectives, key Study engineering and operational criteria, project delivery requirements and constraints, alternatives development approach and level of detail required, alternatives evaluation metrics, and a description of final technical report requirements. Key assumptions, considerations and other factors to be used in the alternatives evaluation process will be documented.

Task Four: Development of Up To Five Penn Station Capacity Enhancement Alternatives (16 weeks)

The LTK Team will develop up to five alternative concepts with sufficient detail to confirm first-cut physical and operational feasibility, complexity of construction, and comparative cost estimates and construction schedules. It is assumed that three of these alternatives will be infrastructure focused and two will be primarily operations focused. Concept design will sufficiently define each alternative's location, primary features, relationships and connectivity to existing and proposed tracks as well as to proposed Penn Station, NY improvements as set forth in the joint Amtrak, LIRR and NJ TRANSIT funded planning effort completed in 2015.

Development of concepts will be through a two-step process. In the first step, an initial sketch level concept will be prepared for NJ TRANSIT review and approval. This sketch plan level will involve a diagrammatic layout only showing key track connections, number of platforms, and potential pedestrian access and connectivity points. Upon agreement on each sketch plan level concept, the LTK Team will advance the concept to the conceptual design level.

Alternatives development at the conceptual design level will include:

- Track plans and profiles sufficient to confirm special track work arrangements, grades, and clearance requirements. As required to confirm feasibility, the outside edge line of structures will be shown on plan drawings.
- Critical cross sections will be developed as required to illustrate spatial feasibility of proposed concepts identified alongside existing and planned constraints, including columns and foundation, and connectivity to existing Penn Station, planned future Penn Station enhancements, the NYCT subway stations, and PATH stations. This will include the identification of potential tail tracks and/or eastward extensions of existing and/or proposed tracks.
- Track schematics that illustrate track layout (including conceptual interlocking limits), and relationship of track to platforms.
- Operational diagrammatics based on the above-referenced track schematics that show

peak hour (typically 7:30 to 8:30 a.m.) service levels on each segment of the existing and proposed infrastructure with arrows identifying typical train flow.

- Pedestrian connections with existing Penn Station and Moynihan station, subway lines on 6th, 7th, Broadway, and 8th Avenues, and PATH's Herald Square Station at 32nd Street.
- General footprint of construction access points and key ancillary facilities requirements such as ventilation shafts.
- Conceptual architectural plans and sections as required to demonstrate feasibility of station egress and access capacity and connectivity with Penn Station, the future Moynihan Station, applicable NYCT stations, and the streetscape. Architectural drawings will be general arrangements. No detailed floor plans, program requirements, or renderings are assumed.

Development of the conceptual engineering design will be done through an integrated team approach with design development and constructability reviews proceeding concurrently both to inform design and to consider alternative feasibility within the evaluation criteria developed under Task 3. The LTK Team will keep NJ TRANSIT abreast of ongoing design development and evaluation for each alternative at Study Status meetings and will identify any concerns regarding any alternative's physical, operational, constructability, cost, or implementation schedule feasibility. If any alternative is found infeasible during development, the LTK Team will work with NJ TRANSIT to document a preliminary screening effort that will allow limited study resources to be focused on those alternatives most likely to satisfy NJ TRANSIT's goals and objectives. As such, the ingoing assumption is that three infrastructure focused alternatives and two operations focused alternatives would advance through the study, but based on analyses the study may result in full development fewer alternatives. Any efforts to focus resources will be done in coordination with NJ TRANSIT.

Deliverables for Task 4:

- Conceptual plans for up to three infrastructure focused alternatives showing how track and platform changes and additions will be configured to increase train and passenger capacity. The conceptual plan sets will consist of plan and profile drawings outlining track and platform locations and pedestrian connections. Critical cross sections with key dimensions will be provided, especially where existing development, underground stations, and utilities pose a substantial potential constraint. Conceptual plans will identify locations where proposed alternatives fit within the envelope defined from Tasks 1 and 2 and will identify where property impacts or modification to existing structures will be identified. The conceptual plan sets will consist of plans outlining track and platform locations and pedestrian connections.
- Conceptual plans for up to two primarily operations oriented alternatives showing any minor track and signal configuration changes that could be used in coordination with changes to operating policies to increase train and passenger capacity.

Task Five: Evaluation of Alternative Concepts (16 weeks)

The evaluation of alternatives will be performed in concert with the development of alternatives. Part of the evaluation effort will be done as the alternatives are being developed to inform their development in accordance with agreed upon performance requirements and delivery constraints. Key evaluation efforts that will be integral with concept development will include constructability reviews, operational analyses, and pedestrian connectivity studies.

Once the alternatives are fully developed, or once they are developed to a point that will allow for preliminary screening to refocus efforts on the most promising alternatives, each alternative will be subjected to the agreed upon comparative evaluation approach developed under Task 3. Each alternative will be compared and contrasted against the other alternatives so that the evaluation adequately describes the relative positive attributes and challenges of each concept.

Distinguishing attributes and differences between alternatives will be highlighted. A key objective of the evaluation will be to have the evaluation matrix tell the story to the extent possible of how the developed alternatives meet proposed Study goals and objectives outlined at the outset; to provide increased rail capacity and fit within the physical and project delivery constraints outlined in Task 2.

NJ TRANSIT staff will work concurrently and in coordination with the LTK Team to develop relevant information on first cut determinations of train operational requirements and pedestrian flow needs. NJ TRANSIT staff will also provide any forecasts of future passenger demand for NJ TRANSIT's rail services.

The movement assessment defined in the Inventory task will be critical to this phase as it will help to define the access and circulation interventions that will feed into the evaluation matrix and screening process. The team will work with NJ TRANSIT staff in an iterative manner to develop alternatives such that any new passenger movements from alternatives considered are integrated with existing passenger movements and currently planned improvements such as the Central Concourse Extension.

Pedestrian Analysis and Evaluation

The feasibility of alternatives will have as much to do with the ability to provide sufficient egress capacity, ADA compliant accessibility, and ample connectivity to Penn Station, the future Moynihan Station, applicable NYCT subway and PATH stations, and the overlying street scape and development as it will with the constructability and track connectivity of the below-grade rail tracks, tunnels, structures, and ancillary facilities. Any proposed new platforms must not suffer the same pedestrian connectivity problems of the existing Penn Station platforms. The following key architectural and pedestrian efforts will be undertaken to inform the development and evaluation of alternatives.

- Review relevant existing reports, analyses, and proposals related to existing pedestrian movements and improvement needs.
- Undertake data analysis based on information gathered through Task 1 and from NJ TRANSIT.
- Utilize a spreadsheet model to assess existing conditions and impact of ridership growth and new connections at key constraints relevant to proposed alternatives . No pedestrian simulations will be performed.
- Propose efficient and effective arrangement of pedestrian passageways, connections, and vertical circulation elements for new platforms. Studies will utilize existing and available materials as a basis for plan and section drawings that will diagrammatically indicate the required functional elements

Propose improvements to existing station areas, concourse, and vertical circulation elements at connection points to proposed new platforms. Work will not include any significant redesign of the larger Penn Station complex, Moynihan Station, or NYCT subway stations.

Conceptual Construction Cost Estimates and Schedules

Envision Consultants, Ltd. will provide services to prepare conceptual cost estimates and schedules for this assignment as part of the LTK Team. Envision's Senior Estimator, Nicole Johnson and its Senior Scheduler, Anthony Duca, will participate in the Kickoff Meeting to ensure complete understanding of project goals and objectives, and to understand the level of detail expected during alternatives development and the documentation required to make well-informed decisions during the alternatives evaluation phases as a basis for developing future estimates. Throughout the assignment, Envision's staff will work closely with the LTK Team to understand all aspects of the project, and will work hand-in-hand with the engineering and constructability review teams to inform design development and to develop informed estimates. Envision's staff will not merely base their work on take-offs from conceptual plans of highly complex infrastructure improvements. They will understand what it will take to deliver the work proposed under each alternative.

Development of realistic capital costs is a key component of any reputable alternatives analysis study. The objectives of the task capital cost estimates are twofold. First, the expected total project cost for each of the alternatives will be developed to a level of detail sufficient to ensure that the alternative selection process is not distorted by variations in the level of uncertainties amongst alternatives. Second, the total project cost for each alternative will be developed to result in the "expected" actual construction cost at completion. This will be done by escalating calculated current dollar costs to the mid-point of construction in order to ensure that any decision to proceed with further study, is properly founded.

In the computation of each alternative's capital cost, Envision will develop unit prices for major items of work and estimated quantities for those items. At this level of conceptual design, the capital cost estimate will be depicted as a SF unit price, LS cost, and/or allowances based on historical pricing, as well as direct costs for special construction and other special line items unique to each of the alternatives. The estimates will incorporate any anticipated impacts based on work such as construction that must be done outside of normal work hours or limited access areas that will have impacts on construction productivity. Unit prices will be based on statistical data compiled from similar previous construction projects, local/regional area cost data, and vendor information and industry publications. A Basis of Estimate document with assumptions will be provided. Estimates will be prepared using MS Excel software.

The estimates will include allowances for program costs, planning and design, construction management, force account work, and contingencies in order to determine the total project cost for each alternative.

For the scheduling effort associated with this project, Envision will review and closely coordinate with the constructability review team to develop a high-level conceptual schedule for the duration of the project. The conceptual project implementation schedule for each alternative will address critical elements including planning, regulatory approval, design, and construction activities. Key considerations from the constructability reviews will be incorporated into the schedule, including construction contract procurement, long lead items, available work windows, work access

limitations, materials procurement and movement, force account works, and any testing and commissioning requirements.

Constructability Review

Understanding the general proposed construction approach will be critical to communicate proposed construction methods and potential impacts to senior management; to understand the environmental reviews that will be required; to understand potential service impacts; to identify potential implementation phasing; and, to develop capital costs and construction schedules. The evaluation of the required construction approach will include not only the construction methods, but also the general sequence of excavation; expected limits on construction operations; expected limits of project disturbance including lay down areas and construction access; and access and methods for removal of excavated material. Construction cost and schedule development will consider coordination required with related projects.

A key input to the constructability review will be the understanding of the current configuration and historical development of the station, including, but not limited to, the area adjacent to and below 31st Street assembled through Tasks 1 and 2.

The alternatives evaluation effort will include development of a preliminary risk register to identify the potential preliminary major risks to each potential alternative. The preliminary risk register will be used to ensure that conceptual plans do not inherently contain any generally perceived insurmountable challenges[1] and to propose preliminary mitigation strategies. This work will be focused on the following areas:

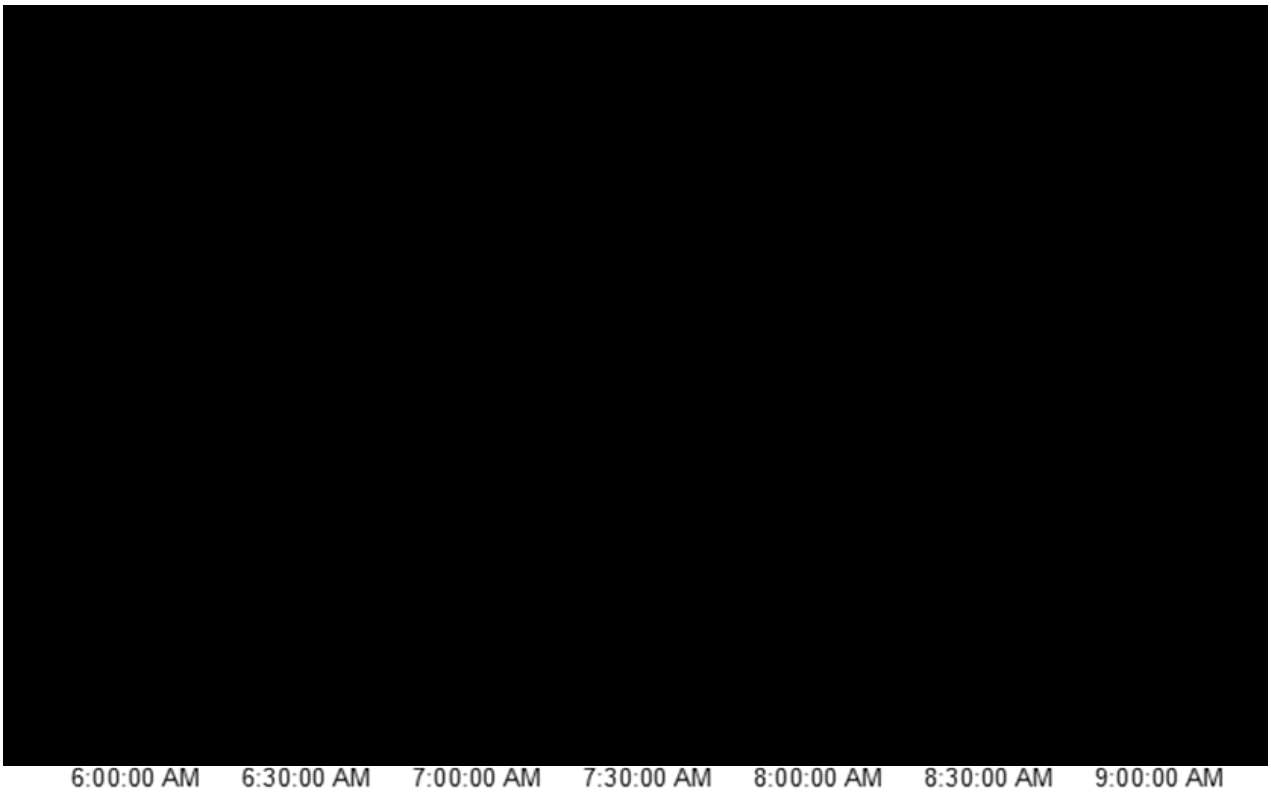
- Potential stakeholder concerns and risks including utility and property impacts.
- Regulatory approval requirements and associated potential risks.
- Preliminary proposed sequencing and coordination of work with identified planned projects.
- Historical obstructions and the condition/nature of existing construction.
- Potential challenges with staging the work to provide sufficient space for economically feasible construction while maintaining existing Penn Station, NY, subway or PATH station operations.

Operational Analyses

The LTK operational analysis team will work in close coordination with NJ TRANSIT staff to develop preliminary operational requirements, with a focus on providing input to the conceptual design of alternatives, and to evaluate the operational benefits and potential impacts during construction and operation of alternatives.

[1] The consultant team will confer with NJ TRANSIT staff on the definition and limits on what might be termed a "generally believed insurmountable challenge".

The LTK operational analysis team will employ its Station Track Assignment Utility to determine the NJ TRANSIT trains per hour benefits of the potential station improvement alternatives, including modifications to existing PSNY tracks and platforms required for new platform alternatives considered. The goal of the operations work will be to quantify the preliminary trains per hour benefits without undertaking a full network rail simulation analysis. This analysis requires a comprehensive description of the physical and operational constraints at Penn Station New York (PSNY) in order to maximize benefits of track assignments. Individual platforms at the station have multiple physical constraints that must be considered. The Station Track Assignment Utility can complete the track assignment and utilization analysis very quickly provided that all of the requirements are well described to the utility. The first step in the process is to ensure that the utility can closely mirror existing station track assignments based on these defined requirements. LTK completed this work as part of the MTA Penn Station Operations Study, an effort from 2009 to 2015 that NJ TRANSIT partly funded. An example of the utility output for existing operations, closely mirroring a day with high on-time performance, is shown below.



Track properties for the existing station are well-defined, based on the work of the New York Terminal Planner, a position partly funded by NJ TRANSIT. The usable length of each station track is normally from leaving signal or bumping post to the leaving signal for the track, but other constraints on the usable track length may necessitate a track-specific exception to this usable length criterion. In the case of a difficult track assignment, it may be necessary to increase the usable length of one or more tracks in the station, based on the use of certain "pull-up" signals within the limits of the berthed train. Doing so may decrease the flexibility of routing trains into

and out of the station, but is a common occurrence. The track properties input file will be updated to reflect the unique attributes of each alternative developed at a conceptual level by the design team.

The utility also includes routing constraints that describe which tracks are accessible from entrance points into the station, such as the existing North River Tunnels, Empire Connection and future trans-Hudson tracks.

The analysis will employ rules for track preferences of individual NJ TRANSIT, Amtrak and LIRR services. These are to be represented based on the current operating agreements and potential changes in the operating agreements under the proposed alternatives.

The analysis will require specific inputs with respect to the shortest scheduled dwell times at the station. These differ by railroad, by type of service, revenue/non-revenue attributes and type of operational manipulation (through running versus turn). Unless otherwise directed by NJ TRANSIT, LTK will use dwell assumptions agreed to by the three existing Penn Station railroads, as well as Metro-North, in recent TriVenture operations planning efforts.

Achieving a higher level of seats per hour on NJ TRANSIT trains is among the objectives of this work. Also, a portion of this work may help set the stage for wider discussion among the current Penn Station, NY rail service operators on the maximization and use of future increased new train capacity. If new capacity can be created, still at a considerable capital cost, it is incumbent on the rail operators to define ways to maximize the benefits in terms of increased capacity such investments might make possible. As an integrated part of the operational analysis team, NJ TRANSIT will be able to provide specific direction dwell time assumptions or other operational analysis parameters used for planning purposes.

The analysis, in terms of overall capacity, will also include assumptions made by NJ TRANSIT in its development of the Portal North Bridge Federal Transit Administration Capital Investment Grant application. This included the operation of larger trains that would be required to utilize existing PSNY Tracks 7-12 in order to platform all cars in a particular consist. NJ TRANSIT will provide this information to the CONSULTANT team.

Allowance for Additional Operational Analyses - $40,000

The LTK Team understands that it may be directed, at NJ TRANSIT's discretion, to develop for comparison purposes a separate set of alternatives that consider the potential impacts and benefits of modifying various train operations policies in the station. These current policies include the scheduling of longer dwell times for reliability and customer service standards and institutional limits on the number or locations of tracks that are available to a given operator. If directed, such additional analyses would involve LTK's operations team working closely with NJ TRANSIT staff to reassess dwell time and other operating standards used for earlier study efforts that examined operating performance at PSNY. The goal of this additional operations analysis is to identify and assess theoretical changes to NJ TRANSIT operating standards that could potentially result in increased capacity. Considerations for this effort, if pursued, would be NJ TRANSIT's ability to make potential changes while maintaining reliable operations, identification and costing

out of any required capital improvements, and identification of any associated increase in O&M costs. These high level analyses, including of the capacity implications of adjustments to minimum required dwell times, would be intended solely for informational purposes.

Note that any additional such analyses authorized by NJ TRANSIT are not included in the proposed Task Assignment schedule or base cost estimate.

Deliverables for Task 5:

- Items under this task, including documentation of evaluation of alternative, preliminary risk register, conceptual capital estimates, and proposed preliminary project implementation schedules will be included under deliverables for Task 6.
- Qualitative assessment of operating cost implications of each alternative, including potential need for additional Rail Operations supervision, additional Maintenance of Equipment personnel, need to staff multiple ticket and customer information locations, possible less efficient use of NJ TRANSIT fleet, and other operating cost considerations.
- Technical memoranda as required to summarize results from additional "as directed" operations analysis efforts to increase train capacity at PSNY without significant capital costs or impacts to ongoing operations if the NJ TRANSIT elects to invoke the optional operations analysis allowance.
- Deliverables for Additional Operational Analyses, if authorized would be defined during scope development.

Task Six: Study Conclusions Report (9 weeks)

This task will focus on developing a Technical Report that clearly and defensibly documents the work completed and the results of the Study effort. In addition, this task will involve development of an Executive Summary Report to provide NJ TRANSIT's Study leadership team with a high-quality summary document that can be shared with NJ TRANSIT Management and with key project stakeholders. The Executive Summary Report will include key Penn Station capacity constraints, issues to be resolved, concepts identified as proposed solutions suitable for advancement, and recommended next steps to move those concepts forward.

The LTK Team will also work closely with NJ TRANSIT staff to identify recommended next steps for consideration in developing future work plans for further planning, engineering and design.

The Technical Report will be structured to demonstrate three key points:

- First, that suitable due diligence has been undertaken to identify, gather, review, and incorporate existing and planned constraints and proposals for capacity expansion at Penn Station.

- Second, that suitable due diligence has been undertaken to identify one or more feasible alternatives based on a high-level conceptual planning and engineering effort that can be subsequently pursued.

- And third, that the recommended next steps in advancing those alternatives are clearly defined, well founded, and worth any proposed additional effort for their advancement.

Deliverables for Task 6:

- Draft and Final Technical Report documenting the evaluation of alternatives in accordance with the agreed upon evaluation approach. The reports will include an evaluation matrix that allows for a comprehensive comparative analysis of competing alternatives in line with agreed upon metrics that readily illustrates how each alternative supports Study goals and fits within Study constraints. Conceptual capital and operating cost estimates, proposed preliminary project implementation schedules, risk registers, benefits, and impacts will be identified for each alternative.
- Draft and Final Executive Summary Report suitable for distribution to a broad audience of potential internal and external Study stakeholders to build support for advancement of recommended alternatives.

Task Seven: Coordination, Meetings, and Progress Reporting

The LTK Team will participate in up to six study status meetings. Of these six, at least one may include other agencies. The LTK Team will participate in up to six additional, topic focused conference calls with NJ TRANSIT staff and other agencies. Monthly progress narratives and study budget updates by task will be submitted to the Study manager at least one week in advance of all study status meetings.

NJ TRANSIT staff will handle meeting and conference call arrangements. Goals and objectives of each meeting will be agreed upon between the LTK Team and NJ TRANSIT in advance of each meeting or conference call to ensure they do not impede the progress of this high-level and compressed schedule planning study.

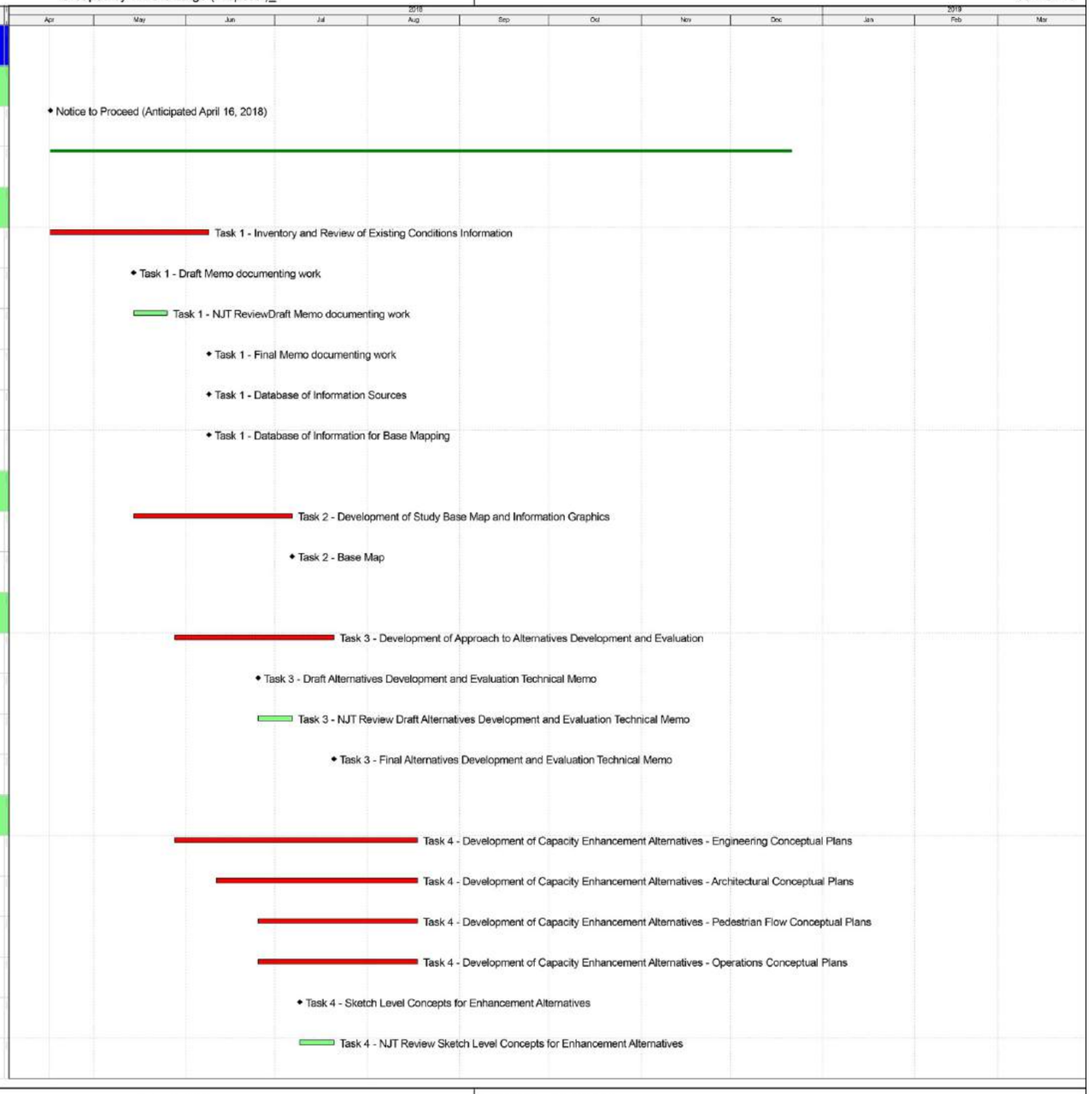
No outreach meetings are anticipated as part of this effort.

Deliverables for Task 7:

- For each of the up to six study status meetings (five internal and potentially one outside agency) updates, the LTK Team will prepare:
    - Study status updates.
    - PowerPoint presentations for use in meetings that illustrate discussion topics, issues to be resolved, and decisions reached and required. All such presentations will be marked “Draft”.
    - Meeting agendas and minutes.

New York Penn Station Capacity Improvements | Grouped by WBS-3 Large (Proposal)_1 | 09-Mar-18

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
New York Penn Station Capacity Improvements		180d	180d	16-Apr-18	21-Dec-18
Administrative / General		180d	180d	16-Apr-18	21-Dec-18
1	Notice to Proceed (Anticipated April 16, 2018)	0d	0d	16-Apr-18	
10	Project Management / Document Control	180d	180d	16-Apr-18	21-Dec-18
Task 1 - Inventory and Review of Existing Conditions Information		40d	40d	16-Apr-18	08-Jun-18
100	Task 1 - Inventory and Review of Existing Conditions Information	40d	40d	16-Apr-18	08-Jun-18
110	Task 1 - Draft Memo documenting work	0d	0d		14-May-18
115	Task 1 - NJT ReviewDraft Memo documenting work	10d	10d	14-May-18	25-May-18
120	Task 1 - Final Memo documenting work	0d	0d		08-Jun-18
130	Task 1 - Database of Information Sources	0d	0d		08-Jun-18
140	Task 1 - Database of Information for Base Mapping	0d	0d		08-Jun-18
Task 2 - Development of Study Base Map and Information Graphics		40d	40d	14-May-18	06-Jul-18
200	Task 2 - Development of Study Base Map and Information Graphics	40d	40d	14-May-18	06-Jul-18
210	Task 2 - Base Map	0d	0d		06-Jul-18
Task 3 - Development of Approach to Alternatives Development and Evaluation		40d	40d	28-May-18	20-Jul-18
300	Task 3 - Development of Approach to Alternatives Development and Evaluation	40d	40d	28-May-18	20-Jul-18
310	Task 3 - Draft Alternatives Development and Evaluation Technical Memo	0d	0d		25-Jun-18
315	Task 3 - NJT Review Draft Alternatives Development and Evaluation Technical Memo	10d	10d	25-Jun-18	06-Jul-18
320	Task 3 - Final Alternatives Development and Evaluation Technical Memo	0d	0d		20-Jul-18
Task 4 - Development of up to 5 Penn Station Capacity Enhancement Alternatives		60d	60d	28-May-18	17-Aug-18
400	Task 4 - Development of Capacity Enhancement Alternatives - Engineering Conceptual Plans	60d	60d	28-May-18	17-Aug-18
405	Task 4 - Development of Capacity Enhancement Alternatives - Architectural Conceptual Plans	50d	50d	11-Jun-18	17-Aug-18
410	Task 4 - Development of Capacity Enhancement Alternatives - Pedestrian Flow Conceptual Plans	40d	40d	25-Jun-18	17-Aug-18
415	Task 4 - Development of Capacity Enhancement Alternatives - Operations Conceptual Plans	40d	40d	25-Jun-18	17-Aug-18
420	Task 4 - Sketch Level Concepts for Enhancement Alternatives	0d	0d		09-Jul-18
430	Task 4 - NJT Review Sketch Level Concepts for Enhancement Alternatives	10d	10d	09-Jul-18	20-Jul-18



Remaining Level of Effort | Remaining Work | Milestone
Actual Work | Critical Remaining Work

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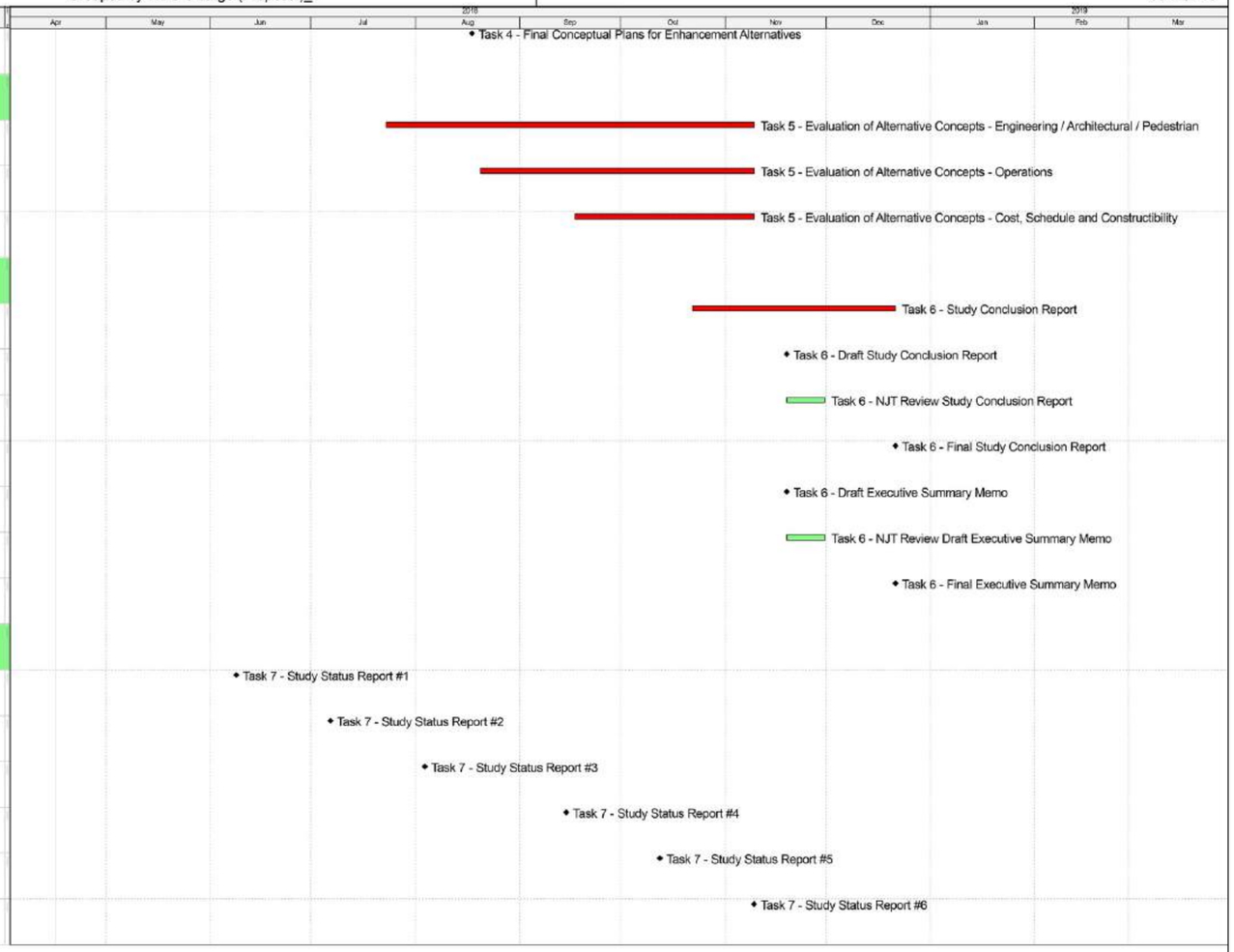
TASK filter: All Activities

New York Penn Station Capacity Improvements | Grouped by WBS-3 Large (Proposal)_1 | 09-Mar-18

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish
440	Task 4 - Final Conceptual Plans for Enhancement Alternatives	0d	0d		17-Aug-18
Task 5 - Evaluation of Alternative Concepts		80d	80d	23-Jul-18	09-Nov-18
500	Task 5 - Evaluation of Alternative Concepts - Engineering / Architectural / Pedestrian	80d	80d	23-Jul-18	09-Nov-18
510	Task 5 - Evaluation of Alternative Concepts - Operations	60d	60d	20-Aug-18	09-Nov-18
520	Task 5 - Evaluation of Alternative Concepts - Cost, Schedule and Constructibility	40d	40d	17-Sep-18	09-Nov-18
Task 6 - Study Conclusions Report		45d	45d	22-Oct-18	21-Dec-18
600	Task 6 - Study Conclusion Report	45d	45d	22-Oct-18	21-Dec-18
610	Task 6 - Draft Study Conclusion Report	0d	0d		19-Nov-18
620	Task 6 - NJT Review Study Conclusion Report	10d	10d	19-Nov-18	30-Nov-18
630	Task 6 - Final Study Conclusion Report	0d	0d		21-Dec-18
640	Task 6 - Draft Executive Summary Memo	0d	0d		19-Nov-18
650	Task 6 - NJT Review Draft Executive Summary Memo	10d	10d	19-Nov-18	30-Nov-18
660	Task 6 - Final Executive Summary Memo	0d	0d		21-Dec-18
Task 7 - Coordination, Meetings and Progress Reporting		110d	110d	08-Jun-18	09-Nov-18
700	Task 7 - Study Status Report #1	0d	0d		08-Jun-18
710	Task 7 - Study Status Report #2	0d	0d		06-Jul-18
720	Task 7 - Study Status Report #3	0d	0d		03-Aug-18
730	Task 7 - Study Status Report #4	0d	0d		14-Sep-18
740	Task 7 - Study Status Report #5	0d	0d		12-Oct-18
750	Task 7 - Study Status Report #6	0d	0d		09-Nov-18



Remaining Level of Effort | Remaining Work | ◆ ◆ Milestone
Actual Work | Critical Remaining Work

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TASK filter: All Activities